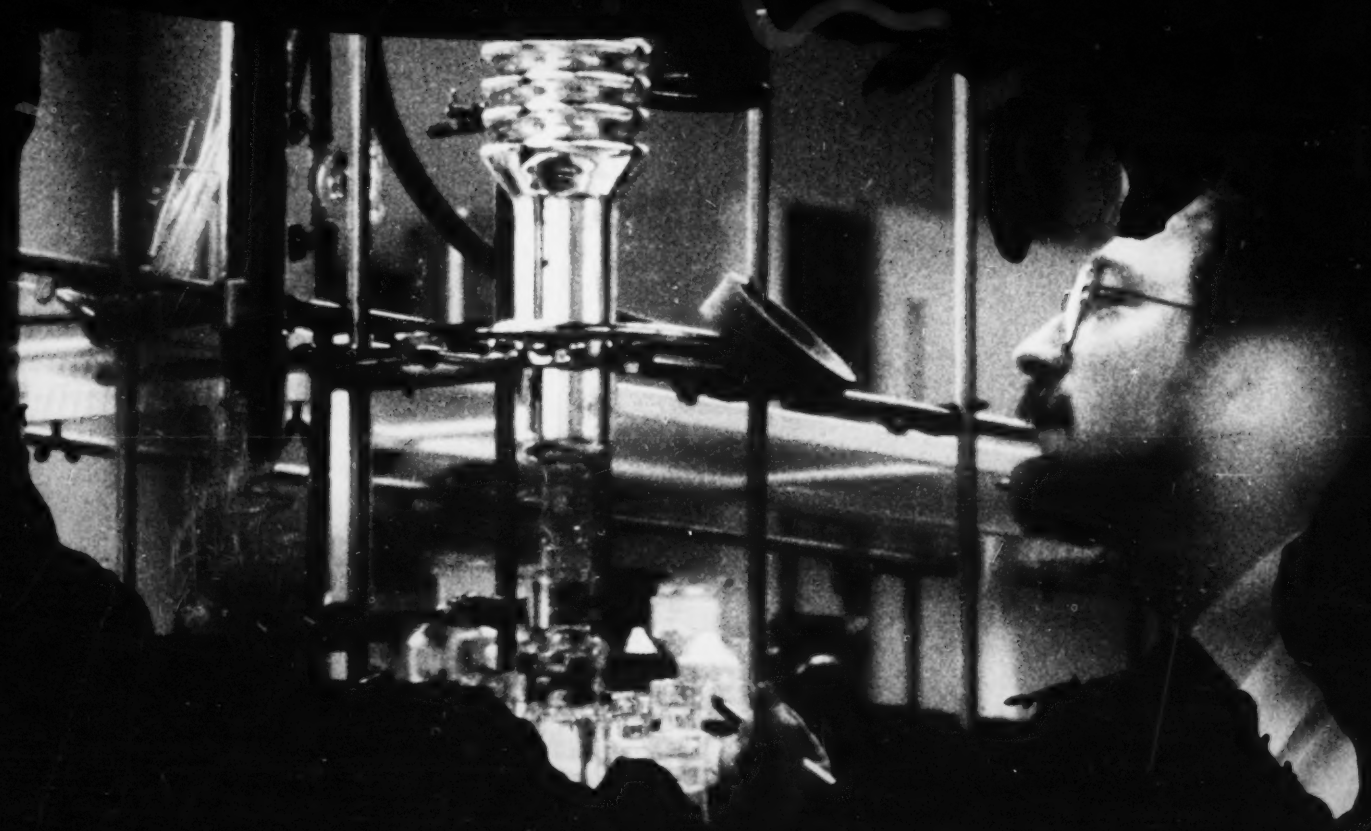
A1250-1
3/12/87

MARCH 9, 1987

CHEMICAL & ENGINEERING

NEWS



Chemistry & Public Policy

The links have been forged over many years

Page 20

0511179C097 9 K AR6510SL 1
CONGRESSIONAL INFO SERV-SRI
4520 EAST WEST HWY SUITE 800
SRI ACQUISITIONS
BETHESDA MD 20814

CHEMICAL & ENGINEERING NEWS

Volume 65, Number 10
CENEAR (10) 1–48
ISSN 0009-2347

MARCH 9, 1987

News of the Week

■ **Office of Science & Technology Policy faces special challenges in wake of shakeup of White House staff.** **Page 4**

■ **First results of National Ozone Expedition to Antarctica indicate that ozone loss occurs in layers.** **Page 5**

■ **National Academy of Engineering elects 82 engineers to academy membership, including several in chemically related areas.** **Page 6**

■ **Sterling Group, an investment firm specializing in leveraged buyouts, is scheduled to purchase Corpus Christi Petrochemicals and ICI America's ethylene oxide/glycol business.** **Page 6**

Cover: Photo courtesy of W. R. Grace

Business

In 1986, chemical industry productivity rose for the fourth straight year, as unit labor costs fell. **Page 9**

Government

Distribution system of federal R&D funds to universities is examined by General Accounting Office. **Page 12**

Science

Evidence of tunneling's contribution to the rates of chemical reactions in the gas phase is uncovered. **Page 14**

Manic-depressive illness and Alzheimer's disease are two major mental disorders for which genetic link has been found. **Page 15**

Perkin Medal

J. Paul Hogan and Robert L. Banks are recognized for their pioneering work on polypropylene and polyethylene. **Page 30**

Books

Martin Kenney examines the development of biotechnology from the academic laboratory to commercial reality. **Page 31**

Special Report

The chemical sciences have become increasingly enmeshed with public policy issues, from the early days of alchemy to the industrial revolution to the present. **Page 20**

Letters 2
Editor's Page 3

Concentrates
Business 7
Government 11
Science/Technology 13

The Departments
ACS Focus 33
ACS News 34
Meetings 35
People 36
Newscripts 48

Chemical Industry Productivity Continued To Rise in 1986

William J. Storck, C&EN New York

Productivity in the U.S. chemical industry rose once again in 1986 as unit labor costs fell, according to recently released government figures. It was the fourth straight year that both measures improved.

Since the recessionary years of the early 1980s, the chemical industry, and indeed U.S. industry as a whole, has been taking measures to increase productivity. The large reductions in force in employment, process improvements, and the trimming back, where possible, of employment costs have all been a part of this effort. And it has been working. Since 1982, the rate of growth for productivity in the U.S. chemical industry has averaged almost 7% annually. And the cost per unit of labor output has declined at an average rate of about 2% per year.

Productivity is defined as output per workhour, calculated by dividing the Federal Reserve Board's index for production by the Labor Department's index for aggregate weekly hours of production. Unit labor costs are labor costs per unit of output, figured by dividing indexes for wages by indexes for output per workhour.

According to C&EN's calculations, productivity for chemicals and allied products in 1986 increased 5.5% from 1985 to an index of 142.1 (1977 = 100), more than twice as fast as the 2.5% increase seen for all manufacturing. The index for all manufacturing for the year was 138.9. The improvement for chemicals resulted from a 4.6% increase in production and a 0.9% decline in

Productivity for chemicals gained 5.5% in 1986, for all manufacturing only 2.5% . . .

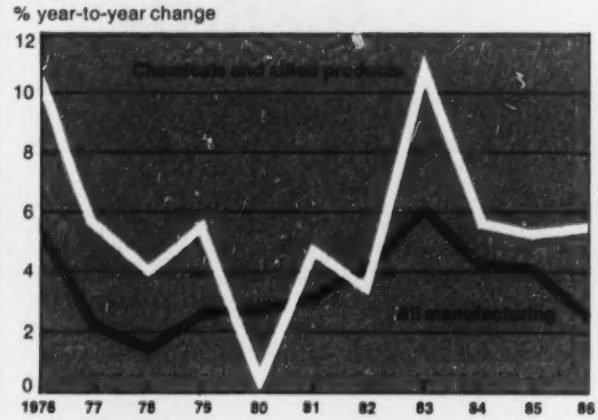
Indexes, 1977 = 100	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977	1976
CHEMICALS AND ALLIED PRODUCTS											
Production	132.9	127.1	121.6	113.9	103.8	112.6	106.4	113.3	106.3	100.0	92.0
Workhours	93.5	94.3	95.0	93.9	95.2	101.7	101.0	103.1	102.2	100.0	97.3
Productivity	142.1	134.8	128.0	121.3	109.0	110.7	105.4	109.9	104.0	100.0	94.6
Hourly production wages	186.1	180.1	172.7	164.8	155.0	141.8	129.2	118.2	109.2	100.0	91.9
Unit labor costs	130.9	133.7	135.0	135.9	142.2	128.2	122.6	107.6	105.0	100.0	97.2
ALL MANUFACTURING											
Production	129.2	126.4	123.4	113.9	102.2	110.5	108.2	110.7	106.1	100.0	94.1
Workhours	93.0	93.3	94.8	88.2	87.0	97.9	98.9	106.2	104.5	100.0	96.1
Productivity	138.9	135.5	130.1	124.8	117.5	112.9	109.4	104.2	101.5	100.0	97.9
Hourly production wages	171.1	166.9	161.5	155.4	149.6	140.7	128.1	118.0	108.6	100.0	91.9
Unit labor costs	123.2	123.2	124.1	124.4	127.3	124.7	121.5	113.2	107.0	100.0	93.8

. . . but in fourth quarter productivity for chemicals fell and for all manufacturing rose

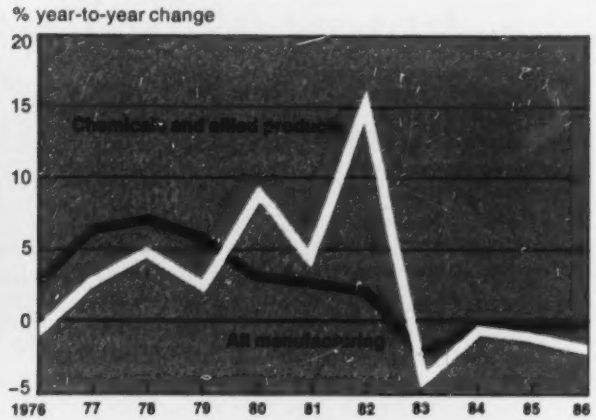
	Quarters, 1986				Quarters, 1985				Quarters, 1984		
Indexes, 1987 = 100	4th	3rd	2nd	1st	4th	3rd	2nd	1st	4th	3rd	2nd
CHEMICALS AND ALLIED PRODUCTS											
Production	133.4	134.1	132.8	131.3	127.9	128.1	126.8	125.8	123.6	122.8	120.4
Workhours	94.2	93.4	93.1	93.4	93.8	93.9	94.5	95.1	94.9	95.4	94.9
Productivity	141.7	143.6	142.7	140.6	136.3	136.4	134.1	132.3	130.2	128.8	126.9
Hourly production wages	188.7	186.9	184.8	184.1	183.9	180.7	178.6	177.3	176.5	173.5	171.2
Unit labor costs	133.2	130.2	129.5	130.9	134.9	132.5	133.1	134.1	135.5	134.7	134.9
ALL MANUFACTURING											
Production	130.4	129.4	128.4	128.4	127.4	126.8	126.2	125.3	124.9	124.6	123.0
Workhours	93.1	92.5	92.8	93.6	93.5	92.9	93.0	93.8	94.6	95.1	95.2
Productivity	140.1	139.9	138.3	137.3	136.3	136.5	135.6	133.7	132.0	131.1	129.1
Hourly production wages	172.2	171.0	170.8	170.5	169.4	167.8	167.0	163.6	163.8	161.6	160.6
Unit labor costs	122.9	122.2	123.5	124.2	124.3	122.9	123.2	122.4	124.1	123.3	124.4

Sources: Federal Reserve Board, Department of Labor

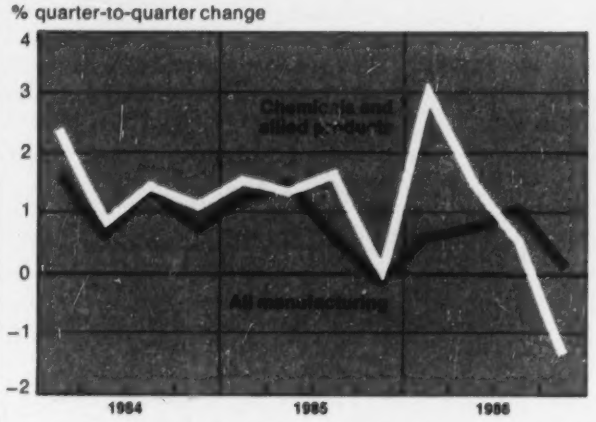
Annual chemical productivity gains still outpace those for all manufacturing . . .



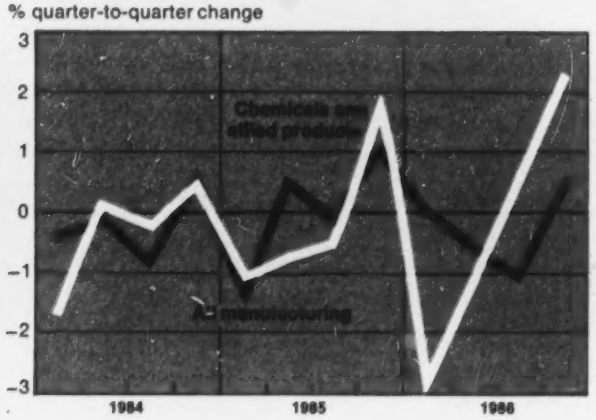
. . . and unit labor costs for chemicals continue to fall faster



Quarterly growth of chemical productivity has ended . . .



. . . and unit labor costs for chemicals have increased in past two quarters



Note: Productivity is output per workhour, calculated by dividing indexes for production by indexes for workhours of production employees. Unit labor costs are labor costs per unit of output, calculated by dividing indexes for wages by indexes for output per workhour. **Sources:** Department of Labor, Federal Reserve Board

aggregate workhours. Again these measures were better than those for all manufacturing, for which output increased 2.2% and workhours fell 0.3% from the year before.

Unit labor costs improved in the chemical industry by declining 2.0% from 1985 to an index of 130.9. This measure for all manufacturing was the same as it had been the year before at 123.2. Hourly production wages for chemicals, however, increased faster than for all manufacturing, rising 3.3% compared with 2.5%.

Some may question how much longer the chemical industry can sustain the kind of productivity increases of recent years. And, indeed, some signs of weakening in the growth rate have emerged. The first sign was that, though the rate of growth was higher in 1986 than in 1985—5.5% compared with 5.3%—the quarter-to-quarter rate of change for productivity has been slowing for the past three quarters. After garnering a respectable 3.2% growth rate in the first quarter of 1986 over the final three-month period in 1985, the quarterly rate has been dwindling. In the second quarter, growth was 1.5%, in the third quarter 0.6%, and in the final period of 1986, productivity actually contracted 1.3%. This is only the fourth quarter-to-quarter decline in productivity since the beginning of 1982 and the worst since the fourth quarter of 1981.

Much the same picture emerges for chemical unit labor costs. After falling 3.0% and 1.1% in the first and second quarters of 1986, unit labor costs in the chemical industry, on a quarter-to-quarter basis, increased 0.5% in the third quarter and an alarming 2.3% in the fourth quarter. This is the largest quarter-to-quarter increase since fourth-quarter 1983 and the first time since 1982 that the industry has seen back-to-back quarterly increases in unit labor costs.

However, the decline in productivity and the increase in unit labor costs in the fourth quarter are the result of a slight 0.5% fall in production from the previous quarter. A seasonal pickup in the first quarter of this year may easily put the chemical industry on the track of improved productivity once again. □

Academia's Federal R&D Funding Probed

A frequent complaint about the federal research and development funding that goes to universities is that it is concentrated too much in too few large universities. Another complaint has been that an "old boy" network operates in the peer review process that keeps new investigators from getting a fair share of the government largess.

Sen. Mark O. Hatfield (R.-Ore.), as chairman of the Senate Committee on Appropriations in 1985 (now the ranking minority member), asked the General Accounting Office to examine federal research funding to see if the complaints were true. The GAO report released late last month finds that some universities do get large percentages of research funds, but there is a lot of variation as well. The report also finds some justification for the current peer review process.

GAO examined the top 100 institutions receiving federal funds from the National Science Foundation and the National Institutes of Health in fiscal 1967 and compared them with institutions receiving the most funds in fiscal 1984. It says that distribution of research funds relies on several factors, including demographic and socioeconomic factors, total state population, number of employed scientists and engineers, number of Ph.D. degrees granted, and state per-capita spending on higher education. By concentrating on the 20 universities with the largest federal funding, GAO investigators determined that in the past 17 years there has been little change in which universities receive the most funds. Only four institutions have changed ranking in that time.

But, when GAO looked at individual science categories and how funding was divided, a different mix resulted. For instance, in the physical sciences area, which includes chemistry, six universities among the 20 with the most funding for physical sciences are not among the top 20 in terms of total federal R&D funding. The same holds true for the other categories. What is happening, GAO says, is that so much federal research money is going into life sciences research that schools with large programs in this area, particularly those with research medical schools, have a bigger pool to draw from. The result is that almost all the top 20 universities in the life sciences category are also the top 20 in overall R&D funding. Physical sciences receive only 13% of research funds, so emphasis on physical sciences at a university probably means less overall funds, and therefore a lower ranking.

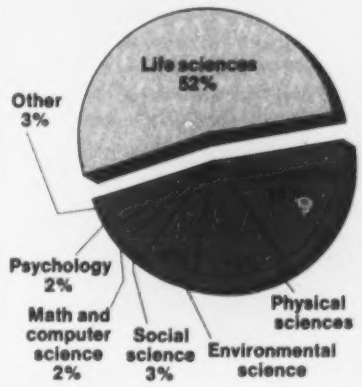
The issue of peer review has been studied before and defies simple analysis. GAO points out that measuring the validity of peer review is difficult because it is so subjective, involving the judgment of many people on the merits of a particular research proposal. GAO compared the distribution of grants under the open peer review system of NSF and NIH with the internal review system used by the Department of Defense. The only conclusion that could be reached was that the internal DOD process concentrated funds in fewer states and institutions than did the outside review process.

Another aspect of peer review examined was the success rate of different colleges in getting proposals accepted. GAO found that among the 20 highest-funded schools, the success rate averaged 43% for NIH and 50% for NSF. Institutions ranking below the top 20 had success rates averaging 38% at NIH and 35% at NSF. Although the success rate for the lower-ranked schools was lower, the difference between the higher-ranked and lower-ranked schools is not very large. GAO reached no conclusions and made no recommendations regarding peer review of research proposals, but says peer review, by itself, does not account for the concentration of federal research funds to institutions.

Copies of the GAO report, "University Funding: Patterns of Distribution of Federal Research Funds to Universities," can be obtained by writing to the U.S. General Accounting Office, P.O. Box 6015, Gaithersburg, Md. 20877.

David Hanson, Washington

Life sciences dominate in federal research funding



Source: National Science Foundation

MIT gets most federal physical sciences funds

Physical sciences funding rank		Total federal R&D rank
1	Massachusetts Institute of Technology	2
2	Stanford University	3
3	Cornell University	7
4	California Institute of Technology	29
5	University of Wisconsin, Madison	9
6	University of Illinois, Urbana	18
7	University of California, Berkeley	14
8	University of Pennsylvania	13
9	University of Rochester	25
10	University of Chicago	19
11	University of California, Los Angeles	6
12	University of Texas, Austin	22
13	University of Maryland, College Park	44
14	Harvard University	10
15	Michigan State University	36
16	University of California, San Diego	8
17	Columbia University, Main Division	5
18	Indiana University	49
19	Yale University	11
20	Johns Hopkins University	1

Source: Data from fiscal 1984, General Accounting Office

NOTE

ONLY THE FOLLOWING PAGES OF THIS

PUBLICATION HAVE BEEN FILMED

Cov. 1, pgs. 1, 7-13